



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/753,330	01/09/2004	Shigeo Yoshii	60188-726	7252

7590 05/13/2005

Michael E. Fogarty
McDermott, Will & Emery
600 13th Street, N.W.
Washington, DC 20005-3096

EXAMINER

MONDT, JOHANNES P

ART UNIT	PAPER NUMBER
2826	

DATE MAILED: 05/13/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

577

Office Action Summary	Application No. 10/753,330	Applicant(s) YOSHII ET AL.	
	Examiner Johannes P. Mondt	Art Unit 2826	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 April 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) 1 and 8-11 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2-7 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☒ Certified copies of the priority documents have been received in Application No. 09/895,213.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>1/9/04</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of the Group I invention, Species 2 (claims 2-7) in the reply filed on 4/4/05 is acknowledged.

Information Disclosure Statement

The examiner has considered the items listed in the Information Disclosure Statement (IDS) filed 1/9/04 with the proviso that the first six (6) of listed Foreign Patent Documents have erroneous names of first inventor(s), which examiner has corrected by hand (and initialed). A signed copy of Form PTO-1449 is herewith enclosed.

Specification

The Specification is objected to for not disclosing the subject matter of claims 2-7. In particular, nowhere in the remainder of the Specification Applicants disclose the claim limitation "the third semiconductor layer emitting light with charge injected therein from the second and *third* semiconductor layers" (claim 2, final three lines, and claims 4 and 6, lines 10-12). Said disclosure is necessary in light of 37 C.F.R. 1.75(d). Applicants should either add said disclosure or remove the limitation from the claims.

See, however, the indefinite nature of this limitation as noted below.

Claim Objections

The following is a quotation of the relevant paragraph of 37 C.F.R. 1.75 (d) that forms the basis of the claim objection made under this patent rule in this office action.

The following is a quotation from the relevant sections of the Patent Rules under 37 C.F.R. 1.75 that form the basis of the objection made in this office action.

(d)

(1) The claim or claims must conform to the invention as set forth in the remainder of the specification and the terms and phrases used in the claims must find clear support or antecedent basis in the description so that the meaning of the terms in the claims may be ascertainable by reference to the description (see § 1.58(a)).

Claims 2-7 are objected in view of the absence in the remainder of the Specification of any disclosure of the limitation as recited in claim 2, final three lines, and claims 4 and 6, lines 10-12, in particular the injection into the third semiconductor layer from the second and third (sic) semiconductor layers of charge as well as the third semiconductor layer emitting light thereby. Applicant should either disclose the claimed subject matter in the remainder of the Specification or else cancel the limitations in the claims.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. **Claims 2-7** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In particular, the limitation "the third semiconductor layer emitting light with charge injected therein from the second and *third* semiconductor layers" (three final lines of claim 2, lines 10-12 of claim 4 and of claim 6) renders these claims indefinite because charge is stated to be injected from one layer into itself.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. ***Claims 2-3 and 6-7*** are rejected under 35 U.S.C. 102(b) as being anticipated by Ogura (5,414,282). The following rejection is offered subject to the rejections under 35 U.S.C. 112, second paragraph made above. The examiner assumes in the sequel that Applicants mean that the third semiconductor layer emits light because of the electrons accumulated therein by injection from the emitter and consequent recombination with the holes resident inherently in the third semiconductor layer (for claims 2-3 and 6-7, and with complete and consistent reversal of p- and n- type conductivity applied to this statement for claims 4 and 5). *Ogura teaches* a semiconductor light-emitting device (cf. col. 5, l. 20-21 and col. 8, l. 27-34) comprising: first and second semiconductor layers 16 and 12 respectively (cf. col. 10, l. 19-24 and col. 10, l. 33-46), each of first conductivity type (n-type) (loc.cit.); a third semiconductor layer 14 (cf. col. 10, l. 30-34) of second conductivity type (p-type) provided between the first and second semiconductor layers, the third semiconductor layer having a forbidden band as an electron band which is smaller in width than a forbidden band in each of the first and second semiconductor layers (cf. col. 10, l. 52-55); and a graded composition layer 15 (col. 10, l. 33-46) provided between the first and second semiconductor layers to have a varying

composition which is nearly equal to a composition (0.4 for the Al stoichiometric parameter) of the first semiconductor layer at an interface with the first semiconductor layer 16 at an interface with said first semiconductor layer (col. 10, l. 24-30) and to a composition of the third semiconductor layer (0 for said Al stoichiometric parameter, which indeed correspond to the composition of said third semiconductor layer 14 as the latter is made of p-GaAs; col. 10, l. 30-32), the third semiconductor layer emitting light (cf. col. 8, l. 27-38) with charge injected therein from the (emitter) second semiconductor layer (said charge being electrons and) recombining with the holes that are present in said third semiconductor layer (see rejection above under 35 USC 112 for deviant language and the conditional nature of this rejection).

On claim 3: the impurity concentration in the second semiconductor layer 12 is higher at least in a region thereof opposite to the first semiconductor layer than (the impurity concentration) in the first semiconductor layer 16 (cf. col. 10, l. 19-24 and col. 10, l. 39-43).

On claim 6: Ogura teaches first and second semiconductor layers each of n-type conductivity 16 and 12 respectively (cf. col. 10, l. 19-24 and col. 10, l. 33-46); and a third semiconductor layer 14 (col. 10, l. 30-34) of p-type conductivity provided between the first and second semiconductor layers, the third semiconductor layer having a forbidden band as an electron band which is smaller in width than a forbidden band in each of the first and second semiconductor layers (col. 10, l. 52-55); the third semiconductor layer 14 emitting light with charge injected therein from the second semiconductor layer (said charge being electrons and) recombining with the holes inherently present in the third

Art Unit: 2826

semiconductor layer (by virtue of its p-type conductivity) (see rejection above under 35 USC 112 for deviant language and the conditional nature of this rejection), an energy value at a lower end of a conduction band as an electron energy band being higher in the first semiconductor layer than in the second semiconductor layer, inherently so because of the monotonic decrease in band gap with increasing impurity concentration regarding the impurity concentration of the first semiconductor layer 16 is less than the impurity concentration in the second semiconductor layer 12 (cf. col. 10, l. 19-24 and col. 10, l. 39-43) (see, e.g., Handbook Series on Semiconductor Parameters, Volume 2, section 1.2.3 (page 9) for quantitative data on the by itself inherent band gap narrowing as a function of donor concentration).

On claim 7: as already mentioned under claim 6 the impurity concentration in the second semiconductor layer 12 is higher than in the first semiconductor layer 16 (col. 10, l. 19-24 and 39-43).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. ***Claims 4 and 5*** are rejected under 35 U.S.C. 103(a) as being unpatentable over Ogura (5,414,282) in view of Ogura (5,667,552). Claims 3 and 4 differ only from claims 6 and 7, respectively, through full and consistent interchange of p- and n- type conductivity, said conduction and valence bands consistently corresponding to the

respective conductivity type selections. First: nothing in the specification explains why the particular selections made in claims 4 and 5 for first and second conductivity types as claimed elsewhere (e.g., claim 2) are critical to the invention. On the contrary, the joint inclusion of all physically sound selections through joint inclusion of claims 6 and 7 additionally to claims 4 and 5 indicates the opposite, namely: that said selections are not critical to the invention. Second, Ogura teaches as much by stating that pnp may also be used in his novel optoelectronic switch rather than npn bipolar transistors (cf. col. 10, l. 11-15). Third, Ogura, in a closely related patent including npn phototransistors, states that pnp phototransistors can similarly be used and similar operation may be achieved by reversing the connections of the emitters and collectors (cf. 5, l. 29-33). Therefore, it would have been obvious to enlarge the scope of the invention through inclusion of the teaching by Ogura (5,667,552) thus widening the design possibilities, said widening being in itself sufficient motivation to include said teaching by allowing freedom of design.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Johannes P. Mondt whose telephone number is 571-272-1919. The examiner can normally be reached on 8:00 - 18:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan J. Flynn can be reached on 571-272-1915. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2826

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JPM
May 4, 2005

Patent Examiner:

A handwritten signature in black ink, appearing to read 'J. Mondt', with a stylized flourish at the end.

Johannes Mondt (Art Unit: 2826)